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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/659,435 | 09/11/2003 | Cem Basceri | M4065.0528/P528-A | 4094 |
| 24998 | 7590 | 03/28/2005 | EXAMINER | |
| DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP | | | PERT, EVAN T | |
| 2101 L Street, NW | | | ART UNIT | |
| Washington, DC 20037 | | | PAPER NUMBER | |
| | | | 2826 | |

DATE MAILED: 03/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/659,435

Applicant(s)

BASCERI ET AL.

Examiner

Evan Pert

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 65-103 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 92-103 is/are allowed.
- 6) ☒ Claim(s) 65,66,74,75 and 84-88 is/are rejected.
- 7) ☒ Claim(s) 67-73,76-83 and 89-91 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 0903 & 1004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 85 is objected to because "claim 86" at line 1 should read --claim 84--.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 65, 66, 74, 75, and 84-88 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,780,704 B1 to Raaijmakers et al..

Regarding claim 65, the Raaijmakers et al. reference discloses a method of forming a MIS capacitor [abstract] on a semiconductor substrate (12) comprising the acts of: forming a semiconductive layer (i.e. HSG) over a substrate (12); forming a dielectric layer comprising aluminum oxide (col. 15, Table I) over said semiconductive layer by ALD [col. 15, lines 19-26]; and forming a metal nitride layer over said dielectric layer [col. 21, line 42 to col. 23, line 25].

Regarding claim 66, the semiconductive layer is formed of hemispherical grained polysilicon [col. 15, line 20].

Regarding claim 74, the metal nitride layer is a titanium nitride layer formed by ALD [col. 22, lines 11-17].

Regarding claim 75, the TiN is formed by "ALD," therefore necessarily "using a nitrogen source and a titanium source precursor" [col. 22].

Regarding claim 84, the aluminum oxide dielectric layer is formed by ALD using an ozone source and an aluminum source precursor [col. 15].

Regarding claim 85, said aluminum source precursor is TMA col. 15, line 22].

Regarding claim 86, the aluminum oxide dielectric layer is formed to a thickness of about 10 angstroms to about 500 angstroms [col. 14, lines 27-45].

Regarding claim 87, aluminum oxide dielectric layer is formed to a thickness of about 25 angstroms to about 100 angstroms [col. 14, lines 27-45].

Regarding claim 88, the aluminum oxide dielectric layer further comprises a material selected from the group consisting of tantalum oxide, zirconium oxide, hafnium oxide, hafnium-aluminum-oxygen alloys and lanthanum-aluminum-oxygen alloys [col. 21, lines 17-40].

Allowable Subject Matter

3. Claims 92-103 are allowed.
4. Claims 67-73, 76-83 and 89-91 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
5. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 92-103, the prior art does not disclose an advantage of applicant's particular combination of forming HSG, forming a dielectric composite stack comprising aluminum oxide on the HSG and forming tungsten nitride over the dielectric composite stack.

Regarding claims 67-72, the prior art does not disclose the "act of opening the grains," only forming the grains to be open [].

Regarding claims 73, 76-80 and 82-83 the prior art teaches away from CVD by directing one to the advantage of ALD.

Regarding claim 81, the prior art does not discuss an advantage of particularly choosing tungsten nitride.

Regarding claims 89-91, the prior art does not disclose the particular combination of aluminum oxide and tantalum oxide as claimed.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan Pert whose telephone number is 571-272-1969. The examiner can normally be reached on M-F (7:30AM-3:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ETP
March 20, 2005


EVAN PERT
PRIMARY EXAMINER